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INAUGURAL ADDRESS

By the PRESIDENT,

BARON FERDINAND VON MUELLER,

K.C.M.G., F.R.S., M. & Ph.D., &c.

The first duty, devolving on me at this auspicious gathering, is to offer on behalf of the present Council of the Australasian Association, and not less from the depth of my own feelings to all, assembled now, the very best of welcome. Patronised by the noble representative of her Majesty, graced from exalted station also by the first lady of the land, generously countenanced by the Premier and the other members of the Ministry, extensively sustained by Melbourne citizenship, and prominently supported by the University, we enter on this second meeting of the Association with every bright prospect. Indeed, our hopes are raised still more by the success, achieved already in the eldest metropolis, since, through the genius and circumspect assiduity of the Sydney University Professor of Chemistry, the great home movement became extended to these southern colonies. Called unexpectedly for this year to the position, which magnanimous impulses and unbounded generosity have assigned to me, I must so far speak of myself, as to assure you, that this mark of consideration will ever be valued by me beyond all expression; that I am conscious of having no claims to this high favour, unless it be by scientific seniority in these colonies, and that I will endeavour to fulfil those expectations, which are justly set on leaderships in a grand festive concourse, such as we are now to celebrate. Before proceeding, it is incumbent on me to express my rejoicing at so large and so splendid an attendance at this meeting, which is even encouraged by the genial smiles of so many ladies; and further, to offer my homage to the distinguished office-bearers, to the kindful hosts and notably also to the accomplished Secretary, through whose united perseverance, graciousness and energy the hopeful aspect of the Melbourne gathering is mainly due. My eminent predecessor, the Government Astronomer of New South Wales, has in a powerful and learned address sketched the origin and objects of the British

Association for the Advancement of Science, the fifty-eighth meeting of which was held in Newcastle during September of last year. Thus the bearings and aspirations of these science-musterings came anew before us here also from the great British home, whose lead and aims we are anxious to follow and to imitate even in these respects. Whoever shared actively or even only passively in the engagements, for which this extensive union has been established, whether in Britain or on the continent of Europe or in America, must have realised how much vitality is infused into science-work by these Associations through whole communities, how immensely inspiring the personal contact with leaders in progressive thought is to individual workers of all ranks and in all directions; how plans are formed and problems submitted, otherwise likely unattended to or left indefinitely postponed, and how powerful and trusty an influence by this widely spreading and annually refreshed organisation can be exercised on the public mind, to speed progress, particularly of utilitarian tendency, in a telling and in an impressive manner. Indeed, with the inauguration of this Association commenced a new era for science in these dominions of the British Crown. It is to us a movement of historic significance of its own. It falls to the share of the greater gatherings, from which ours is an offspring, to review the advance of science throughout its various branches in the older seats of learning; I will therefore not attempt at the youthful stage of the Association here, to lay before you any methodical and connected accounts of more recent events on the walk of knowledge, even should I thereby not anticipate, what my honoured colleagues may wish to explain or record in the respective sections, over which they preside. Indeed, in these distant locations it seems at present more important, to clear away some scruples, which prevent recognition of our purposes, or to render more fully known the wide accessibility, afforded for joining in these periodic gatherings. The destination of this institution is a far wider one, than may be supposed generally by our fellow colonists. The word "science" seems in British communities often to be understood, to apply to researches in the domain of nature exclusively. The acceptance of the word in this sense would exclude from our scope much of the best *éclat* of what we desire to accomplish, whereas really we here would wish to embrace in our range of discussions and operations, whatever was meant by the ancient word "*scire*" and hence "*scientia*." We would extend this meaning as far as ever the rays of knowledge can illuminate, as far as ever the power of thought can penetrate. Social science, for which at the Exhibition of 1880 a congress was held here, over which our erudite honorary Treasurer presided, can merge readily now into sections of this Association. Though we cannot expect every member, perhaps according to

some European standard, to be engaged actively in pursuits of discovery with a strict scientific bearing, I feel sure to express the feelings of all, whom professional positions or amateur-inclination bring together on the path of knowledge, when I affirm, that the Association joyously and gratefully welcomes all who will cheer us in our aspirations, will listen to our discussions, and will support us by that moral influence, which every educated and thoughtful layman can bring to bear. Ours is a kind of scientific federation full of soul. Every one can help. The wide scope of the Association thus being rendered patent, as well as the ease of access, it might next be asked by the uninitiated, what are the more direct objects, what the more immediate tendencies, what the final destinations of this organisation, spread now also to a distant corner of the globe like ours? As you might foretell, we accept on Australian soil this movement—started by an illustrious sage of Edinburgh—in all its bearings, hopes and responsibilities, with perhaps this one preference, that, while we endeavour to follow the cosmopolitan course, as adopted in the northern world, we would cherish some predilection for maintaining a command over the fields of indigenous work in these far southern regions, without any wish however of monopoly, but with that patriotic sense, becoming to us as residents in this particular portion of the British Empire. Irrespective of carrying on original research, worthy of a country of juvenile freshness, it is our duty more especially, to instil the flow of information from so manifold sources near us in such a manner, that new growth for further developments may arise through that limpid course in all possible directions. We should and could arouse anew also all those, who may slacken, by example and by new inspirations. You can carry a spirit of research into the family-homes; you will leave in many an hospitable house, which opens its doors in a year of choice to illustrious participators of these meetings, many reminiscences not less pleasurable than profitable through life. I shall not speak here of the living among leaders in progressive knowledge, of those who yet are shining forth at the British Association also; but I would wish to pay a word of homage to the dead—to those, whom many of you have still met, and on whose busts at solemn moments we would wish, if even in thought only and passive pensiveness, to place also here a laurel wreath. Thus, among Britons, such names come before our memory as those of J. Herschel, James Ross, Faraday, McClure, Sabine, W. Hooker, Lindley, Brewster, Wheatstone, Murchison, Darwin, Speke, Carpenter, Lyell, Brodie, Gould, Livingstone, Sedgwick, Berkeley, G. Bentham, Simpson, Proctor and a host of other luminaries, reminding us likewise of an early Melbourne University professor, who at a meeting of the British Association about the middle of the century, was one of its principal

secretaries. To one meeting the greatest lustre was given by the presidency of H.R.H. the Prince Consort. As there is a brotherhood of all nationalities in science, it may be pardonable when from my own bit of career I allude to some experiences of forty-four years ago, while attending as an active member what might be called the German Association for the Advancement of Science. A flight of thought brings vividly before me again such illustrious personages as Schleiden, one of the earliest investigators of the living cellule; D'Alton, one of the founders of embryology; Langenbeck, the great and conservative surgical operator and his long-renowned disciple, Esmarch. There were also the Scandinavians Oersted, Forchammer and Steenstrup, the one the main discoverer of electro-magnetism, the other eminent in northern geology, the third an early expounder of alternative generation. It is as if I hear once more the voice also of Kunze, the pteridologist; of Rammelsberg, a leading expert in analytic chemistry; of Waitz, the horticultural monographer of the Ericeæ; of Volger, one of the great authorities on volcanoes; of Krauss, the zoologic Caffrarian explorer; of Sonder, one of the authors of the Cape-flora, and of Schacht, Roeper and Muenter, the eminent morphologists and physiologists; some of gay communicativeness, others of calmer reservedness—all spreading knowledge in their own way, all happy and elated among their scientific compeers, but also well aware, that their coming together then might be an only one in life! It is, as if I were brought once more face to face with many a hero in science, nearly all now numbering with the dead; some of whom having attended the earliest meetings of the British Association, and thus by their appearance, then grey, among a multitude of junior investigators, linked together in a most fascinating and exalting manner one generation with another in science. A felicitation could then still be sent to Oken, the founder. You can all enter into the feelings of Virchow, who at the Berlin meeting of the German Association in 1886, while unfolding to the 3000 members once more the roll-book of 1828. There were the names of Humboldt, as President, of Berzelius, Ehrenberg, Woehler, Rudolphi, Gauss, Weber, Johannes Mueller, Mitscherlich, Rose, Magnus, of Oersted also, and of many another scientific immortality, each either a founder of a branch of science or a rearer of it into extensive vigour. Well may Virchow have exclaimed, that it was as if life became infused once more into the dead signatures! No doubt many assembled now in this hall experienced similar emotions, when attending meetings of the British Association, where they first of all, and perhaps never again, saw individually some of the coryphæans, of whom they had ever so often heard and read, for whom they cherished an unlimited veneration, and whose memory became thus dearer still. Some of the younger members, now here

present, may yet be spared to participate as veterans in the centenary celebrations of Sir David Brewster's founding the parent Association. To some extent and in a vivid manner we shall be able, to measure the onward course of science here by the periodicity of these gatherings from year to year, from decade to decade. Much human faculty is always going to waste; let this Association in its popularity collect all stray forces, especially as here, on new grounds, the very novelty of research must stimulate to more ardent action and keener emulation. Crude empiricism gives way in all directions to scientific ruling; the multitude is awakening more and more to the importance of exact research; a tide has set in to carry knowledge with all accumulating discoveries into every possible application; hence the rapid strides of technic art and rural industries, particularly in young, bustling communities. Yet commerce, as well as handicraft, often still undervalues science-work, while daily benefiting from it, though unseen, unrecognised and unregarded. But this Union can make its influence felt through deliberations and direct recommendations, and perhaps most powerfully so, because its tendencies are so eminently practical and so unselfish. Much in that direction are indeed our efforts, our aspirations, our hopes! We can at measured intervals in this Association connect researches with an extensiveness and universality such as no other organisation can effect; yet we do not enter into rivalry with localised societies or institutions of learning; contrarily, on them we lean mainly for our mental sustenance.

The field of research is ever widening, but the horizon gets clearer; the objects of research become more multitudinous, but the appliances for investigation are constantly enriched; volumes still more instructive supersede one another; methods more facilitous are substituted for those of the past; incontestable observations are daily increasing, the elaboration of systems and records gets more completed, and thus endless difficulties become removed, which beset the path of former workers; by such means an ever-accumulating science-fortune is rendered available without individual freedom being impaired. Yet, while the network of knowledge expands and the width of the meshes decreases, the empty interstices between the threads are proportionately augmented, though the fabric as a whole gains more firmness. The greatest triumph of sciences consists in bringing them into the fullest contact, somewhat in an Aristotelean and Plinian—or speaking of our own epoch—in an Humboldtian spirit.

Discovery has its own rewards, and they are of the sublimest kind. When, as far back as 1817, the founder of the British Association perceived the endless displays of his kaleidoscope, and beheld other before unthought-of marvels, he lifted in pious admiration his eyes to heaven, well recognising that each playful change in the picture or every other result from his optic apparatus

was ruled as much by laws, universal and eternal, as the movements in the planetary world. In recent days the great anatomic Professor Hyrtl, after he saw his main work pass through eighteen editions and through many translations, discourses still, though blind, with youthful enthusiasm in classic Latin on the bearings of medicine. Sir Richard Owen, at the venerable age of an octogenarian, evinces still with freshness of mind a keen and joyful interest in comparative zoography, of which he is one of the main originators. A coëtanean of his through the century, George Bentham, continued like Sir William Hooker after four scores of years still brisk in descriptive taxonomy for the plants of the world—engagements of severity, from which many a young worker even would shrink; the watching of discoveries in their speciality were to them a never-ceasing fountain of delight, a necessity for their intellectual existence. When Haydn, the predecessor of Mozart and Beethoven in composing symphonies, heard with great splendour the performance of his oratorio, the "Creation," one of his last works, he burst into tears at the passage, "It became light," and uttered in deepest emotion the words, "It is not from me, it is Divine inspiration." The vibrations of the Eiffel-tower, the new structure, doubly as high as the Strassburg-spire, were attentively studied by Chevreul at an age of his more than that of a centenarian.

Grand and true discoveries, such as may more and more also here be effected, are not, like meteors, flashing brilliantly but ephemerously across the sky; they are like the discerning of new stars of lasting radiancy; and there is one mighty incitation, inasmuch as every achievement through progressive thought stamps on it the name of the discoverer for all times, and as any single new achievement may have numbers of others in its sequence.

Let it be instanced, what since Galvani's time has been brought about, until with lightning's speed electric messages are now dashing in all directions through the world. It would be invidious to single out anyone connected with this glorious progress for special praise, unless the Nestor of electrology, who in co-operation with Gauss fully fifty years ago issued the atlas of terrestrial magnetism, and still some years earlier made one of the first efforts to span electric wires over wide distances.

What long ago was surmised by Faraday, and later on through calculations by Maxwell, has in the course of 1889 been proved by Professor H. Hertz, of Karlsruhe, from real experiments, that the action of the electric current on the medium, through which it is carried, is the same as that produced by light; further, that the generation of both depends on the same laws, and that the propulsion is effected at the same velocity. The objectionable hypothesis of "action into distance," which Weber already wished to avoid with regard to gravitation, is overthrown by these new demonstrations.

In recent days many surprising and momentous discoveries were witnessed, but few can be alluded to here. Among those, which have a practical and extensive bearing on daily requirements, some originated or were evolved through the genius of Edison, from whom, as one yet in the prime of life, still other inventions may be expected. Here I will refer only to that mode of luminosity, which may be regarded as much cosmic as telluric, and which now is brought within wide technical operation through particularly disintegrated coal glowing in absolute vacuum—not without some previous suggestions and experiments by Sidot and Swan.

So also is it startling, to hear the human voice now with telephonic celerity across a whole country, and hardly impaired in intensity. Through the combination of Gray's or Bell's telephone, with Edison's phonograph, messages can be fixed—as you may be aware—in writing; while, by Hughes's microphone, the sound can be heard with extraordinary distinctness.

Nations are now rivalling to possess the largest telescope, Melbourne still carrying the palm for the southern hemisphere. Indeed, the great equatorial instrument here, with its four feet mirror, is surpassed only by that of Lord Rosse, and equalled only by that of Paris. Astronomy became lately in wondrous details connected with astrophysics and astrophotography. The astronomic department here, under our distinguished treasurer, Colonel Ellery's able administration, will extensively share also in the now commencing international photographic charting of the sidereal heavens. A gigantic refractor-telescope has been placed in the clearest of air at one of the culminations, 4600 feet high, of the Californian coast-range by a generous American mining operator and amateur-astronomer, on whom fortune had smiled; and thus within the last year or two were revealed some empyrean marvels, never beheld by mortal eye before; the nebular ring in Lyra presented quite new and complicated features, and additional stars at or near the cyclic aggregations were discovered by the astronomers of Mount Hamilton, Professors Holden and Schaeberle. Here may be alluded to only one other result of these observers, attained under so exceptionally favourable circumstances within their celestial area, namely the elliptic nebula of Draco, with its fulgent hydrogen and nitrogen, is now shown to consist of coiled rings. New planetoids may thus also from thence come within the range of vision, eight having been observed from elsewhere on the northern heaven during 1888 and at the beginning of 1889, thus bringing recorded numbers up to 283. The power, which would be exercised by very large telescopes placed within the tropics at alpine elevations above the frequent course of clouds in air so much rarified, may be beyond all present imagination. More "about the comets, as supposed meteor-swarms, which have entered the solar system," might

perhaps be learnt from such positions. Spectroscopic observations by Huggins, Secchi, Vogel, D'Arrest, Finlay, Wiedemann, Schiparelli, Hasselberg and other philosophers lead to additional explanations in this respect.

What photography, an art discovered within the lifetime of many assembled here, in progressive scope may effect in future, is as yet mere conjecture. The producing already, but not the fixing as yet, of three of the principal colours within the present processes of this glorious art holds out some hope, that its faithful pictorial representations may become embellished yet by vividity of colouration emanating directly and thus unerringly from operative processes.

In a very different way other questions come before us. Whether in the organic world a supposed involuntary tendency of striving for higher development and further melioration, whenever circumstances are favourable, arises from uncontrolled impulses, so that nothing is left in a stationary distinctiveness! Whether specific values for clear diagnosis and systematic fixity have in the generality of cases been allotted with adequate scope? Whether fertile hybridity is far more extensive, than we have hitherto been led to suppose? Whether diversity in the physical conditions of nature can explain the vaster development of gigantic mammals and birds in the zoologic ages prior to the present? Whether forced accommodation or spontaneous adaptability to altered circumstances of existence can change gradually and even infinitely structural organisations and specific functions? Whether crowding out, however overwhelming, can extend to absolute annihilation in the free fields of nature, when undisturbed by human action, or whether this combat for space and search for nourishment is limited to mere repression? Whether among specific organisations the most powerful always dominate to the extensive suppression of others more numerous? Whether organisms, which in the present creation-epoch became extinct by the hand of man, could possibly ever be restored, by progressive growth, even after many lengthened periods and with every conduciveness for resuscitation? Whether our present means for research are advanced enough, to distinguish all innate peculiarities, with which distinct types in the organic world are endowed? Whether, if all this could be answered in the affirmative, it would be sufficient to account for the marvels of designs in organic individuality connected with vital processes, as revealed to us from the simplest and minutest to the most complex and huge of living beings, all displaying perfection for their own distinct purposes? Whether all our search for what is knowable can ever lead to a worldly insight into the commencement of all origination? Can we contribute from this Association, by original unbiassed research here in new countries, towards the answering these momentous questions?

The wider the climatic range, the greater the variability, so that for studying specific limitations of organic beings we here are placed in a more advantageous position, than those on whom the first elaboration of Faunas and Floras devolved in the home-countries. When a phyto-palæontologist of first rank and life-long experience, such as Goeppert, doubted whether from that branch of knowledge much support could as yet be obtained for the ascendance-doctrine, we are cautioned also so far, not to be over-hasty in construing ideas and evolving theories with a view of universal applications. The opposite views on organic development, defended respectively by two such eminent among earlier naturalists, as Cuvier and St. Hilaire, deserve profound consideration even now-a-days. We are anywhere and anyhow only at the threshold of the temple of truth, and might thus remain conscious of some of the last humble words of even a Newton!

The dictum, supposed to be reliable, "*natura non facit saltus*," is not universally applicable, not even in palæontology, as demonstrated by the three well-marked stages of the American horse. One of the sublimest of poets, not foreign to natural science, must have been persuaded of a Godly operation in nature, when he wrote—

"Wohl erkundbar is das Wirken,
Unerforschlich bleibt die Kraft!"

The world would lose many of its charms to intellectual beholders, if observers sink too much into materialistic explanations and speculative reasonings. We all admire the sagacity, displayed by great leaders in biology, to trace the building up of organic frames, and to follow up observingly what is manifest in respective cycles of vitality; but can we adopt with the evidence attained all the conclusions drawn therefrom? Let us deprecate extending theories beyond what is warranted by trustworthy observations; let us avoid hazarding opinions unsupported by facts; and above all let us distinguish between what is within human grasp and what must ever be concealed to the eyes of mortal beings!

The question has sometimes been raised, what is a billion? but an answer of calculative correctness has but seldom been given, though in some thoughtlessness that enormity of numeric value may be often enough rashly applied. Thus we hear spoken of more than a billion tons of coal deposits in the Chinese province of Shansi; and as the search through carboniferous areas has in this colony also just passed into a momentous stage, it would be well to remember, that in 1884 the actual output of coal came to a total of 409 million tons, two-fifths of this from Britain. From a naturalist's point of view, some fractional approach to the solution of such questions might be arrived at perhaps, when the prodigiosity of nature's displays is considered in estimating, on the basis of some calculation, the total number of spore-caselets on the fronds of our hill-ferntree (*Alsophila australis*) at 400 millions and that of

the spores at 4000 millions ; when further it fairly can be assumed, that a large tree of our silver-wattle may produce as a total from its copious masses of flower-headlets 25 millions of tiny flowers, 800 millions of stamens, and 8000 millions of the compound pollen-grains ; when a red-gum eucylaptus or a manna eucalyptus may exhibit the twenty-fifth part of a billion of stomata in the whole of its foliage.

Let us turn to another subject. Choice areas, not necessarily very extensive, should be reserved in every great country for some maintenance of the original vegetation, and therewith for the preservation of animal life concomitant to peculiar plants. Where the endemic riches are greatest, there also the danger is more imminent of these being swept out of existence, unless timely measures are adopted for the reservation of some sequestered spot, to which rural occupations should never be allowed to have any access with their disturbing influence on primeval harmonies. Such spots should be proclaimed for all times the people's inalienable property, and every inhabitant or visitor of the locality should consider himself the co-preserver of such areas, so as to aid in preventing accidental invasion or casual ignition or intentional spoliation. Furthermore, to such places of security should be transferred plants and animals of exceptional rarity occurring near these seclusions. "Floral commons," thus established, would soon be among the most attractive features, not only for pleasure-excursionists, but also for travellers from abroad, and would afford future generations in various territories some idea of the wondrous natural beauty of vegetable and animal life in its once unique loveliness, pristine grace and unimpaired freedom. Measures like these once initiated would earn enduring gratitude, and would find imitation in all countries, and particularly in those, where nature has scattered its floral gifts most prodigiously over the territorial expanse. Under intelligent supervision such places, through restricted concessions, might be made to yield a greater income, than accruable through ordinary rural occupation. Who would not plead in this cause? as our Field Naturalists' Club has indeed so fervently done already. More and more of rarities are commencing to succumb and to be made unrestorable, and scarcely a spot seems safe on the face of the globe against the defacing hand of man! To the Great Auk no longer any existence was allowed on the remotest hiding-place of Iceland, where the last poor pair succumbed, while courageously defending their nest! Will any remnant of the tribe of the gigantic birds, lingering yet in the recesses of far southern latitudes, perhaps share the same fate? At this instance may be called into memory the touching verses by the greatest of German poets, relating how the chamois is driven by the relentless hunter to the utmost pinnacle of its highland-home, and then the Alp-spirit of the legend sallies forth with wrathful voice, "Pause! why do you hurt my herd?" Space is left for all on earth!

May also the forests be pleaded for here in this assembly?

It should be a fixed plan in national economy anywhere, to maintain masses of forest-vegetation near sources of rivers, and to establish some broad arboreous bordering on streams, where it does not extensively exist, as much calculated to reduce sweeping water-volumes by soakage and mechanical retention. For this purpose, nut-trees, cork-oaks, basket-willows and other trees, prominently utilitarian, could be chosen. To what reflections are you led, when a recent flood of the Mississippi not only devastated the adjoining land in its course, but destroyed also, through protracted submersion, much of the existing riparian woods; when property counting by millions of dollars is lost to a Californian railway company through one single flood directly traceable to destruction of forests; when two-thirds of the inhabitants of the populous Connemaugh Valley perished by the dam-disaster; when so recently and so terrifically quite a million of people were drowned in the floods of the Yellow River, and another million of inhabitants died from starvation, epidemics and other miseries as the sequence of such vast calamity. Merely a small fraction of the monetary losses involved would have sufficed to avert all this, if spent in well-regulated forestry. The cooling of temperature in forests under ordinary circumstances means the reduction of much aqueous vapour to liquid humidity, and further the local re-precipitation of gaseous moisture in aqueous density, with proportionate lessening of evaporation. Each of "our friends, the trees," is a factor, however small, in this calculation.

If really it could be demonstrated, that forests exercise no influence whatever on atmospheric precipitation, not even through electricity,—an opinion lately advanced, but about the correctness of which many do yet entertain the gravest doubt—then still remains to be considered whether through forests any country can obtain the fullest benefit from such aerial downpours as do occur. In North-western America the expression seems proverbial, "Rain follows the plough." The principle in both cases would be the same. Though moisture promotes spontaneous forest-growth, we are fortunately not by its absence prevented, even in almost rainless zones, to clothe bare tracts of country with an arborescent mantle of verdure. Should some one in opulence desire to build up for himself one of the most lasting of monuments, it would be by the bequest of an isolated primeval forest, ever untouchable, for the free enjoyment of the orderly portion of the public. The annual "arbor-day," let us trust, will become universal as a legitimate holiday, which will be looked forward to with delight, particularly by the juveniles, who, with a life of hope before them, can await results from pleasurable action and intelligent forethought. Celebrations like these are not without a lesson to the whole community.

The increment to the wood-estate of Victoria would be now already 200,000 trees annually, if some slight tending followed the impulse of planting; even where trees naturally abound, additions can be made by choices from abroad, as anyhow forest culture should nowhere any longer be limited to maintenance and increase of species possessed by the region, but should in amplification be extended to whatever is best and perhaps available as superior from other lands.

Here, where, so to say, we live under eucalyptus-trees, we are apt to undervalue their hygienic importance, or to discard them altogether. Unfortunately also the multitude, notwithstanding many efforts made, is not yet sufficiently informed on sanitary measures; thus a large proportion of the general public does not even yet seem to recognise, that for plantations, such as were with special forethought raised since the last thirty years around this metropolis, pines were purposely chosen on account of the salubrious effect of terebinthine antiseptic exhalations from these particular trees—a momentous consideration, where hundreds of thousands of inhabitants have already crowded closely together, and where zymotic diseases are so frequent and often so severely raging, not to speak of the æsthetic aspect in a zone of evergreen vegetation, where main-masses of trees with deciduous foliage are out of harmony, while a six months' spring prevails against as much winter-time of colder regions; yet, for all that, what thoughtful people have regarded as the vegetative pride of the environs of Melbourne may be in danger of being sacrificed to capricious tastes and transient fashions. Interplantations of palms, bamboos, and other contrasting plants were long since contemplated under the shelter of the pines, to relieve any imaginary or real monotony produced by large masses of coniferous trees, even where they were miscellaneously grouped. Now to another topic.

If merely to a slight extent the treasures of nature have been studied anywhere, with what enthusiasm are visited then new regions in appreciative knowledge or detail conversedness. The child even on its school-walks, the recreation-seeking pedestrian, the travelling tourist,—after some previous glimpses into nature's arcana—involuntarily sees more for rational and elevating enjoyment than the rest of the people, and that uncostly too, and perhaps even with substantial profit.

In whatever direction our glances are cast on organic nature, we perceive marvels of design from the mouse-sized monkey to elephantine giants, living or extinct; from the smallest humming bird, half-a-dozen of them hardly weighing as much as an ordinary letter, to the now byegone Moa of giraffe-tallness; from the towering huge Athrotaxis (or Sequoia) cypress-pine of California to mosses of almost invisible minuteness,—all perfect in organisation for their own special purposes. But endless other

considerations press on the trained observer, only one to be touched on here. Can the time approximately be determined when the Diptrodon stamped in gigantic paces our plains, and when the Thylacoleon roared in pursuit of other marsupials, now exterminated?

One of the most remarkable of objects within the whole range of biology is that of Symbiosis, the unexpectedly wide extent of which through the empire of plants having lately been demonstrated by Professor Beccari—the hospes not proving detrimental or often not even injurious to the host. Professor Frank very recently discovered that fungus-growth of quite peculiar kind at the extreme ends of the root fibres in oaks, beeches and trees allied to them, mediates the nutrition of them as a necessity. Could all this be merely casual? The Azolla, nourishing a microscopic alge, is an example near to us, just as in other but similar respects the native evergreen beech.

At the very time, when I left Europe, forty-two years ago, Count Suminski discovered, to the surprise of many of us, the antheridous and archegonous organs on the minute prothallus of ferns; but whether and how genetic relation exists between the primordial and the subsequently-developed sporangious organs on fern-fronds has never yet been traced or explained; and this is all the more mysterious as regards fern-trees, such as abound here, when years intervene between the production of the prothallus and that of the spore-bearing caselets. See further the vast significance of what, at first thought, may appear a mere trifling matter.

A small fly (*Lestophones icerya*) was not long ago noticed as antagonistic to the coccid-insect *Icerya purchasi*, by the very observant Mr. Fraser Crawford, of Adelaide, though a closely allied fly, *Lastophonus monophlebi*, infests mainly, if not exclusively, another coccid, the *Monophlebus crawfordi*, as shown by Mr. F. A. A. Skuse, so that even in introducing the particular Diptere needed for subduing the Icerya very discriminative entomology must be brought to bear for coping with an evil of quite dreadful dimensions in Californian orchards, not to speak of what with the less powerful Coccinellides can be done. Thus the Agricultural Department of Washington found it necessary to send a professional entomologist purposely to Australia, in order that the Lestophones be established also on the other side of the Pacific Ocean, to restore thus far "the balance of nature;" just as in another remarkable instance the vines of the United States are largely reared in Europe and elsewhere now for their immunity to the *Phylloxera vastatrix*, which from America invaded other countries. Perhaps this parasite could likewise be subdued by other insects, such as would not attack the vines. If so, a question would be solved involving almost the whole interest of rural prosperity in many wide regions. So then a new special field is opened anywhere for entomologic observations, with a prospect held out of high substantial reward.

The described species of living animals, according to a very recent calculation by Drs. Krauss and Lamprecht, largely from the works of Leunis and Bronn, reach in number one quarter of a million! Of these are Mammals 2,300, Birds 11,200, Fishes 9,000, Mollusces 2,300, Insects 167,000 (with 80,000 Beetles). But even in latest days these numbers became considerably augmented, thus that of the Micro-Lepidoptera from this part of the world by the strenuous researches of Meyrick.

The admissible species of described living plants number not less than 200,000 now, as about 120,000 vasculares, taken in a conservative sense, have been fairly well defined, and as Prof. Saccardo has given in his large recent work alone 27,000 diagnoses of fungaceous plants, so that the total number of supposed species already to be dealt with in descriptive Biology cannot fall very much short of half a million species. Mitten enumerated and diagnosticised, twenty years ago, already 1750 sorts of genuine mosses for South-America; the zealous and accomplished two Vice-Presidents of the Biologic Section have, in spare hours, after their professional engagements, recorded respectively 400 species of seaweeds from the littoral regions off and near Port Phillip, and 600 species of Polyzoa from the extratropic shores of Australia, the polyzoic fauna merely of our great Bay here being richer than either that of the British shores or that of the Mediterranean Sea. Over 1000 species of Australian fishes are contained in the Census, which we owe to the Hon. Sir William McLeay, whom, to our regret, illness obliged to relinquish in the Melbourne meeting the position, assigned to him as a veteran of scientific prominence. Mr. Masters's Catalogue of Australian Beetles, largely from collections of the distinguished naturalist just named, and commenced by his renowned uncle, comprises 7200 species; but since that was published considerable augmentations have taken place. Indeed, thousands and thousands of kinds of insects, particularly others than coleoptera, are fluttering and buzzing as yet unrecognised, unclassified and undescribed in Australian air, entomologists throughout Europe and many elsewhere envying those here for the yet easy chances of obtaining novelties.

Let as an instance of rarity of species be adduced the re-discovery of *Amansia mammillaris* through some action of my own within the last few months on the very isolated Abrolhos-rocks, opposite Champion Bay, perhaps the only place of its existence, from whence a solitary specimen of this oceanic alge, as one most exquisite for delicate beauty, structural tenderness and lovely coloration, was brought by Peron during Baudin's expedition of 1802, and described in 1809 by the Caen Professor Lamouroux, thus tantalising phycologists all the while.

Irrespective of the seven descriptive volumes, mainly by the incomparable Bentham, on the universal vegetation of Australia,

special works on the flora of most of the Australian Colonies are now provided, one for Queensland having been published by Mr. Bailey some time ago, and one for South Australia having been just issued by Professor Tate, who also brought geologic and zoologic considerations to bear on the vegetation there. Mr. C. Moore has furnished the manuscript for the Flora of New South Wales, with a prospect of early promulgation in a special volume. Sir Jas. Hooker's Floras of New Zealand and of Tasmania, quite gems, emanated already many years ago as one of the results of Sir James Ross's antarctic expedition.

Though limiting these remarks to achievements of later times, I do not wish to pass the name of Robert Brown, because not only did he lay most extensively and firmly the basis for the system of Australian vegetation, but it was he also, who took up again morphology for plants, after the long interval since the origination of that branch-science by Wolff, just when it was resumed for animals by Doellinger.*

Through gradually increasing facilities for multiplication in iconography now, so far as plants are concerned, about one-fifth of the known species have become depictured. Of illustrated monographies in vegetable natural history the most urgently required is one on Characeae, an opus, which would be of local interest in every part of the world, and particularly here, where this group of waterweeds abounds.

In one particular respect splendid chances for facilitation or acceleration of science-work are not rarely lost at opportune moments, namely, to acquire extensive authentic collections, the accumulation of which may have involved the sacrifices of recreative ordinary pleasures through a whole life, the disbursement of a private fortune and the main-absorption of a brilliant mind in fixed research, whereby treasures may have been got together for material valuation simply unpriceable. Nowhere applies this more than in young colonies, where no opportunity should be missed, whenever such may suddenly arise at long intervals, to complete the working material from abroad by what may be otherwise utterly unobtainable. The securing of the Linnean collections, by the forethought of a British servant to his country, is an instance in point.

The gifted Secretary of the subsection for Music in our gather-

* A passage from the Address is here omitted, in which the names were given of scientists, prominent in Australia during recent periods and mostly yet active in research; but it proved impossible within the precincts of a general discourse, however propitious the moment, to allude to every one, who had attained celebrity in Australian scientific life. A hope is entertained, that at future meetings of the Association full justice will be done within the special sections to the merits of various and respective individual discoverers, who constitute now already quite a multitude of scientific worthies also in this part of the world. Two deviations from this course will be countenanced by all with due homage—to note especially the superb Decades, largely also palaeontologic, issued during the last 30 years by the veteran Professor of the Melbourne University—and to bestow adequate recognition on the brilliant manner in which the first President of the Australian Association maintains the fame of our eldest Observatory.

ing is among those who endeavored to rouse a spirit for beautifying our landscapes as well as our immediate surroundings. Biologists, particularly, could add to the charms of vernal vegetation anywhere by transferring for naturalisation from land to land, at all events, the minutest of flowers, always innocent, such as here the neatest Candolleas ; the snatching up and forwarding of a few grains of seeds, and their being merely scattered on adequate soil in similar climatic regions, would suffice. Peculiarity in the constitution of the fruit enabled the Cocos-palm to transmigrate on its own accord from its home in the Western Hemisphere to the shores of the Eastern ; it requires other means for the French-bean and the gourds to reach the East ; for the last 300 years they were consumed as a frequent table-food of supposed eastern origin ; but now only has it been shown, by archaeologic researches into the Incas-times, that they belong as indigenous to the western world exclusively. This exemplifies how objects of almost daily concerns can still afford means for original inquiry for almost indefinite periods. The munificence of the learned President of the section for Literature and Fine Arts has fostered also this system of translocation, as shown last year by additional very copious distribution of salmon-ova through Tasmanian streams.

Cassino for 1888 recorded 13,500 scientists as holding recognised positions in various countries ; but the respective numbers given seem adequate only for North America—thus far, nearly 5,000 names being given. This, however, shows the extraordinary vividity displayed there for original inventive work, and that very much of a practical kind.

Young Australia has placed hitherto already through its science-societies about 130 volumes into the libraries of the world, and that mostly during the latter half of the century ; a freshness pervades these literary efforts, commensurate with the ampler originality of sources in new countries. An enlightened journalistic press accords here no less than elsewhere its generous support to science. For the world as a whole mental faculty is displayed, never without a scientific touch, in hundreds of thousands of journals, in uncountable periodicals, and in an endless number of spacious volumes. How is a view to be maintained over this ever-increasing flood of literature, if even for each of us in one or few directions only ? At all events, in greater works a resumé of their salient contents should never be wanting, some summing up of the main-substance, some abridged reference to novel elucidations. The idea of constructing an universal linguistic medium of communication, at first promulgated by Leibnitz in 1666, has occupied the minds of many of the learned ever since. Like numerical figures, chemical formulas and musical notes, such a language is to be readable by each nation in its own words, and the name Pasigraphy has been chosen for it. Volapük affords steps towards accomplishing this,

but does not solve the problem. Can the principle of stenography be drawn into use for this purpose? Classic languages, grandly developed more than 2,000 years ago, continue to give an antique firmness to international writing; but, after all, England has given its language to already one-fourth of the world, a language of powerful conciseness and flexible expressibility, doubtless destined to become still more and more predominating in the course of time.

There is one publication which concerns Australia much, but is in its value here too scantily recognised—that of the Royal Colonial Institute, a union much brought about by the thoughtful activity of H.R.H. the Prince of Wales, and largely tending, through essays and discussions of leading colonists, to unite the interests of the British Colonies with those of the great home-country for more solidifying the Empire.

Chronologic writings exist for political but not for scientific events; a volume of the History of the British Association would almost be equivalent to a connected record of discoveries effected since its founding, as foreign achievements were never lost sight of. A history of all universities from original local archives would carry authentic and comprehensive records of all sciences also into medieval remoteness, and yet could be held within trenchant briefness—local extra-academic working not likely being passed at the respective seats of universal knowledge. By the co-operation of specialists the prominent points of still earlier discoveries might be readily adduced quite into the dawn of civilisation.

A new principle for facilitating scientific pursuits deserves to be alluded to at this occasion on account of its wide applicability, namely: to afford special convenience for original research in distant countries, as thereby additional inducements are offered for particular studies far abroad. A commencement thus far was made by the establishment of the biologic station at Naples. But to the Dutch belongs the credit of adopting ampler measures in this direction, so far as to fit up local working rooms, and as to lessen the expenditure for a lengthened stay of naturalists in Java, one of the most attractive places, as you are aware, for whoever wishes to study nature in its tropical grandeur. Several leading scientists have availed themselves already of this inducement; and Ceylon—still nearer to Europe—so as to be with sufficient advantage within reach during the long annual professional vacations, is now also resorted to. If Australia could follow this example, we would see oftener on our shores illustrious strangers, who might wish to spend a scientific furlough rather among widely different scenes in nature, and to roam among a vast number of new objects, than to travel within much traversed and scientifically more exhausted areas; and they might perhaps come accredited also as delegates to the Australian Association—

should we not prefer to invite purposely year after year representatives from the older seats of learning to gatherings here, as suggested at the last Medical Congress. What a rich store of recent professional experiences would be shed out before us, and how would we, while offering Australian hospitalities, endeavour to reciprocate from what could be obtained from here as scientifically novel. But this principle has still another bearing. In Java, for instance, pulmonary consumption seems never to become developed. More than that, a fortnight's steamer-voyage can bring, at a moderate cost, the phthisic invalid from England to Central America, for reaching, not too far inland, any chosen elevations with light and pure air of easy respiration. The mountain-regions of extra and intra-tropical Australia, as well as some of the elevated inland downs, come likewise within this hygienic scope, especially for sufferers from a home sufficiently near.

Turning to geography, let here the question be asked, as concerning us most, how can Australian exploration be advanced? Talent, enthusiasm and experience are available at any moment for the purpose. Our first historic century has passed; will the chronologic seculum also close, ere the blanks on the maps are filled up? If so, it would be almost a reproach; and may I be allowed to repeat what, in a geographic address, was said some few months ago: "The main work of Australian land-exploration devolved on nine travellers only; now space seems only left for one more great explorer, to rank with the nine. Who will be the tenth to carry off this last of honors, or will it be divided among several less ambitious competitors?" Well may the eagerness be understood, to set the life on winning such a prize!

What a contrast, when we reflect that Pytheas reached the Shetland Islands, his "Thule," at the time of Alexander the Great; and yet, that it should require more than two thousand years before Socotra became carefully explored, and thereby also its unique floral treasures and other natural riches disclosed, this having only been accomplished through action of the British Association by Professor Bailey Balfour within the last few years, though courses of navigation were close to that island since grey antiquity, its endemic aloe-plant having been famed already to the trading Phenicians, but remaining through all that time for science purposes utterly unknown.

Manifold attempts have been made, to map out the leading features of the vegetation of various countries on series of charts, and to treat the stationary fauna similarly: if this was done from adequate material for every great region by united efforts of those, locally best initiated, then might be constructed comparatively complete zoo- and phyto-geographic atlases for the whole globe, and these would unfold at a glance the prominent types in a more impressive and instructive manner than any other. Co-operation is needed, to accomplish this, and more

particularly so in Australia. Our biologists might devise some feasible plan, to advance this subject from year to year at the Association's meeting.

Capt. Engelhardt Jörgensen's singular enterprise, now under progress, to sail in a lifeboat around the world, arose from ideas encouraged and matured in this metropolis. The boat is decked, divided into water-tight compartments, unsinkable, readily portable, never permanently upset, easily set going in accident, and carries drinking water as ballast; it has stood a furious sea near the Bay of Biscay. We may thus expect the venturesome mariner with his companion, to arrive in due time, whereby a deed will be accomplished as daring and unique, as that of his famous countryman, who lately crossed the south of Greenland.

Dr. Nansen is seemingly to receive munificent support from a compatriot for an effort to approach by land the North-Pole from Greenland; this will likely prove the safest route, notwithstanding immense hindrances, because on that line will at all events be mostly a firm footing, and perhaps some game. If the best is made of a full arctic summer with sailing sleighs, it would be shown, to some extent at least, whether Greenland extends in terrestrial continuity still much further than 83° N., while chances likely would accrue of wide views onward from any high elevation. As one likely result, the northern limits of Greenland would at least be determined. At all events, it has now been shown, that arctic altitudes up to 10,000 feet are traversable.

Instances are too rare, considering the enormous private wealth accumulated in innumerable cases, of calling explorers into the field, such as in our days brought Agassiz to the Amazon-river, Stanley, "the bravest of the brave" among geographers, to Central Africa, Nordenskiold along the whole coast of North Asia.

But Australia is not without its Maecenates! Of this you will be reminded in the Wilson-Hall, in the Clarke and Wyselaskie Institutions, connected with the Melbourne University, while in the eldest city of Australia the main seat of science was endowed by Challis's princely munificence, and the Linnean Society is sustained largely in a permanent home by the foremost of Australian zoologists. In the metropolis, west of us, the University owes some of its principal ramifications to the Hughes and Elder bestowals. Ormond College and that of the Artisans here tell their own tale, whereas a statue at the largest library in the Southern Hemisphere commemorates what well directed energy and untiring perseverance can individually bring about. But let us think also of the liberal support, accorded by successive enlightened Ministries and Parliaments, to early and continued studies, without which high-mindedness many researches here could not have reached their present extent.

Turning to antarctics so far as mere temperature is concerned, that to be encountered on the southernmost tableland of ice, would probably not be lower than that endured by Nansen at elevations very lofty in Greenland, and the ascent of the ice-cliffs near Mount Erebus, from convenient points of sloping shores, would likely also not be more perilous, than the scaling of some ice-crests of the Caucasus by members of the Alpine Club last year. The project of renewed south-polar exploration has been discussed in all its bearings by the Antarctic Committee of the British Association, as well as here. We are not even yet aware, to what circumstances the existence of the only deep gulf towards the South Pole is traceable, whether to volcanic influences, or to terrestrial configuration, or to what other causes. Can the increasing pressure, exercised by the constantly enlarging height of the contiguous immense southern ice-masses, induce perhaps volcanic disturbances through the enormous weight? The breaking away of the crust or melting away from beneath, where not on firm land, seems quite out of proportion to the ever augmenting ponderousness, resulting from all aqueous precipitations ever there at once freezing, even at summer-time. What the effect of mere gravitation may finally be on this land of ice without any relieving open interjacent water-channels, concerns us even at such distance here as physicists and also as mere inhabitants very much indeed; and it is worthy of full discussions in our meetings for years to come, particularly if data could be obtained as to the ratio of increase of the ice. The extensive and so patriotic Australian Natives' Association likewise advocates renewed Antarctic disquisition; and surely these efforts will tend, to maintain also the glorious maritime supremacy of the British Nation, displayed formerly in the most distant of southern waters as much as elsewhere.

Now as to our own Alps. The circumspectness and energy of the Council, aided by public and private liberality, has provided enjoyments, some with us not previously realised. Among these is a tour to our highlands. To most Australians and many of the Europeans here a visit to our Alps, through the steam-locomotive more and more coming within ready and easy reach, will have the charms of novelty. Particularly in early or in late hours you will likely behold a kind of airy ocean, surrounding with gigantic waves, phantastic isles, formed by highland pinnacles visible above the sea of vapours, the sun's rays illuminating the calm or drifting clouds, resplendent in colorations of ever-changing and indescribable magnificence. You will there be in the purest of air of lightly respirable buoyancy. Whilst summer-heat parched already the lowlands, you will have vernal flower-fields of unique ever refreshed beauty, to wander over; close to this may lie never-melting snow. In this, what I would call the Australian Switzerland, pasture- and orchard-plots will soon be

the homes of many new highlanders. You will be impressed with the solemnity and almost awe of stillness away from the haunts of man, feelings of human insignificance arising within scenes of nature so incomparably grand; there man is drawing nearer in his thoughts to the Divine Power ruling all.

Science nowhere can stand still! Linguistic science is not foreign to this Association. Thus, then, time-hallowed expressions, though some of them may have come as a glossarian inheritage even from Pythagorean antiquity, and may have continued of daily frequency, will have to give way to wordings in consonance with progressive discoveries. Organography, even in instances of words, to which has been clung with tenacity since the Plinian age, will have yet to undergo some changes for the sake of greater accuracy in definiteness and more clearness in etymology. Commatation in more than one of current languages could be brought better into accord with oscillations of thought. The hyphen might for fuller perspicuity be more drawn into use, and particularly so in organic chemistry, which furnishes, even at the latest of dates, words so unwieldy in reading, and so unpronounceable in length, for its complex-compositions, that one single word may be composed in unbroken array of as many as forty-five letters, not unlike the extensiveness of construction in some Oriental languages; while contrarily, abbreviations to such an extent as "Salol" for the new therapeutic chemical, "Salicylate of Phenol," appear equally deprecable. Speaking of ancient languages, it might passingly here be noted, from researches of Professor Sayce, of Oxford, in most recent days, that a brisk literary intercourse existed in cuneate lettering between all the countries from the Nile to the Euphrates during the fifteenth century before the Christian era. This was shown by unearthing the ruins of the residence-town of Amenophis the Fourth. Contrast with this the still existing stone-age of the Australian Nomades! We here cannot hope, to add much to what has been gathered already of the languages of the Australian aborigines for some further insight into the onward-march of the human races and the history of their progress; but such chances, as may still exist, should not be lost for constructing further vocabularies, ere the remnants of the last tribes are passing away, or abandon their pristine languages, or forget their lore; what can still be secured will be all the more valuable, because it will—at best—be so scanty. Studies of this kind will become more significant, since a Victorian divine, as a missionary in the New Hebrides, traces the language there partly to Semitic origin. Indeed, linguistic research assumes also here now such magnitude, that it might be recommendable to constitute hereafter a division for "science of languages" in the section for literature within this Association. The moment seems an apt one, to pay some homage at this spot also to the bearers of the gospel, who, in their inostentatious yet

severe and perilous task, have to a vast extent gathered, fixed and systematised the languages of savage tribes, doubtless primarily in duties of holy call, but thereby collaterally affording means for comparative linguistic studies and the philologic subjects connected therewith. Indeed, the Bible is now translated into more than 300 languages or their diversified dialects. What an incalculable treasure is stored up by these biblic translations also in wordly aspects! Could the Association possibly do some further good in insisting, that by the force of logic, should be suppressed any defectiveness of thought in much of commonplace conversational and perhaps also literary phraseology, ever without reflection reiterated. Some appellations, vernacular or otherwise, are also here and there open to improvement yet; thus, to quote only one familiar instance, "Gumtrees," professionally speaking, would apply here to the Wattle-Acacias, not to the Eucalypts. For the advantage of conversing in several languages, and simultaneously to have disclosed the treasures of literature in originality, to learn two, three or even four, is at early childhood hardly more difficult than one, if facilities in family-life can be offered to the youthful retentive mind. Even to orphan-children, provided for by the State, this benefit could be extended, inasmuch as some juvenile inmates of orphanages might be readily transferred from the institution of one country to that of a neighbouring one without any additional expenditure for support, and with this philanthropic view, that nations, who unhappily nourish mutual sentiments of asperity, would through the rising generation by closer social contract draw nearer to each other also as great communities, would learn more to respect national character, would recognise more individual worth of their adversaries, would gradually be disabused of hostile prejudices, and would abandon supposed or exaggerated notions of their neighbour's faultfulness or enmity. This principle might perhaps be extended to all classes, with domesticities sure to arise out of it with all their happy influences.

It is most pleasing, to see assigned to the highly scientific art of music so distinct a position at this gathering, the division constituted for it, being moreover enhanced in importance through a renowned composer being identified with it. At all periods of human existence the soul found its sublimest expression in harmonious tones. Emblematically the sacred Scripture seizes on this mode of expression, as conveying to the utmost the ideas of mental loftiness! By nearly a thousand symbols vocal and instrumental sounds were fixed from almost mythologic remoteness down to the olympian festivals; and well might it be wished, that some records of those melodies were left, enchanting as they were even at the dawn of mental culture, to be deciphered or restored at this age. To judge from

the poetry of ancient periods, the music must then already have been pervaded by great depth and richness of feeling. A magnificent piece of music surpasses even so far the most splendid of poems, as its sounds are the eloquence of one universal language. Among great operatic composers is one only, with whom word and sound emanated from the same mind and soul, and it is he also who never spent the sublimest of music on inadequate themes; it is he who, with Meyerbeer, in utmost impressiveness gave to his musical effusions historic vividity, it is he who thus far knew to profit from the incomparable Avon-bard. So long as human suceptibilities exist for what is elevating, so long will master-pieces of music, of poetry and indeed also of pictorial and plastic art be imperishable treasures, may they even have come to us from the time even of the Iliad. If we think of the names of the great masters, should then not also with some thankfulness be a remembrance for those, who drew men of high genius into their path or sustained them thereon? What would have been the fate of Beethoven in 1808, had it not been for the aid of the then Arch-Duke Rudolph, of Prince Lobkowitz and Count Kinski at that turbulent time? What would have become of Schiller at his protracted illness without the annuity spontaneously, in the most delicate of terms, bestowed by the Danish Crown-Prince and Count Schimmelpfenning, and that at a period when national and private resources were alike absorbed to a vast extent, because all Europe was in arms, not to speak of numerous other instances, when genius was in danger to be extinguished by worldly narrowness. The sunny sky of Australia seems to kindle a general love for music, and has called forth many a talent already, some celebrating triumphs in the centres of European art, while a youth of this city carried off there among numerous competitors the Mozart-fellowship. But distinctions for this our great land have not only been earned in the glorious cause of music.

Photolithography, if not altogether it did arise in Victoria, became universally adopted in the particular process, elaborated here, and first explained before our Royal Society by one of Liebig's disciples, who too early became alienated from this colony. There also were first enunciated, however briefly, the views of the author of the *Unseen Universe* on the effects of rays, emanating from various substances; and these early studies were followed up by a long series of appertaining researches at the great Home Observatory of Kew. Brennan's torpedo is a Victorian achievement, recognised as highly important by the British Government, and has proved lucrative to the constructor.

It is about a hundred years ago when Galvani led the knowledge of electricity into new courses for unforeboded vast influences through the technic world; when Goethe conceived the first and far-reaching ideas of organic metamorphosis; when Sir James Smith established the first society of just pretensiveness for a

special science; when the second Jussieu constructed his natural system of plants, perfect for all points but one, unless in details; when the elder Herschel erected his great telescope at Slough, the discovery of the sixth and seventh satellites of Saturn being among the earliest results obtained; when the elder Gaertner founded carpology; when the Danish Professor Otto Mueller established in taxonomy the genus Bacillaria, he, even as a physician, but little foreseeing, what solid basis he was gaining in one direction for the future extension of pathology; when Roxburgh settled in India, as the first to elucidate in a modern sense the flora of an extensive region by independent extra-European researches; when Lavoisier published his *Traité de Chimie* as the earliest main-pillar of the present system of chemistry, not long before he met his cruel fate; when, amidst other contemporaneous exploits, it fell to the share of Vancouver to cast the first anchor in St. George's Sound for vast extension of the British dominions in this continent.

Australia, although one of the latest of original abodes of man, may yet also be destined perhaps to be the field of some of mankind's greatest achievements. The Biblic words, Matthaeus: "It is good for us to be here; let us build edifices," is significantly applicable to advancing civilized settlement through these fortunate dominions.

We are to enter soon on the last decennium of this century, that secular epoch, which to all human foresight will remain the most expansive for discoveries in the world's history, because it would seem, that in most directions not equal opportunities can re-arise for inventive foundation-research within the same space of time. Shall we be in the proud position, that other ages will say, "The nineteenth century has done its work for science well?" And what can yet be accomplished towards its verge here and elsewhere? There will be some summing-up then of the gain of human thoughts so far. Can the geographic chart of our planet be finished by that time? Can the telegraph-wires be connected throughout all countries? Can the outlines of the geologic map of our globe be completed? Can the systematic records of the faunas and floras be mainly brought everywhere to a close? Can an universal meteorology be evolved? Can chemistry exhaust then already the display of elementary substances and of their principal coalescences? And can all this be helped on locally by this Association, if even only to a small extent?

When probably a decade hence this Union will inaugurally reassemble in our metropolis, perhaps to witness then also again another industrial fair of nations in commemoration of the linking together of two centuries, many whom we are gladdened to see yet among us will have passed away, resting under the sods; but though then you will see them no more, they—like earlier contemporaries of some of us—like Sturt, Mitchell, M. Stuart,

Leichhardt, Gould, W. Sharpe, M'Leay, Gunn, Milligan, Sprent, Davy, Jukes, Haast, McKinlay, Clarke, Castleman, Tenison-Woods, Scortechini will have left for future inspiration and due gratitude many science-bequests of enduring value, gained largely on Australian soil; yet some loneliness of its own may perhaps be felt through missing them, for which the contact with a younger generation can perhaps not always fully compensate.

Individual life at best is but short; through "the advancement of science" it can be prolonged, can be rendered capable of much augmented achievement, can be made susceptible to multiplied enjoyments and much increased usefulness. We advance towards a greater future; what would we wish man's destiny in life to be? Can unprosperity be banished through amplest industrial productiveness? Can contentions be abolished by a universal recognition of rights? Can savagedom early be made to cease? Can finally each human being be educated to higher and worthier ideals? Can atheism be made to vanish? Can knowledge with its Baconian password bring its power to bear, to accomplish these most transcendental of objects? Can as interpreters of answers to such cosmopolitan questions all bearers of science throughout the world unite in a mental brotherhood?

And now some few closing words. Though while coming together in this Association we do not engage in political discussions, yet in one aspect we might venture, to diverge from the strict path, marked out for science-votaries—it is in this, to foster also through *our* bonds the "union of the empire," under permanent British supremacy. This must be the ardent wish of every true subject of our gracious Sovereign. Thereto point the grandest traditions, prominence in history, world-wide national influence, immeasurable strength of the realm, irresistible patriotic sentiments; thereto also leads us veneration for the great homeland, with its keen sense of justice, philanthropic clemency, practical tendencies and indomitable energy. May the reflex rays of that national greatness fall ever unobscured on us also here! What are we, whether in science or in any other consideration, without Britain in all its prototypic bearings and glory? Take this away, sever us from this, then the best of impulses, the greater confidence in our purposes, as well as our main guidance and security, would be lost! And where would be our gratitude? Britain bestowed on us a whole continent, with oceanic boundaries, within salubrious zones, exempt from autochthonic complications, with resources uncountable—all as a free gift, as an unencumbered patrimony. The solidity of a great empire will also be a guarantee for the best-connected and most luminous of science-progress in all dominions, over which its sceptre sways; it will ever signalise a power, by which knowledge and enlightenment and indeed religious reverence also, will be carried

with the widest permanency through the world not only for the welfare of the greatest of nations, but also for the tranquillity and happiness of all mankind!

"What guides man in his high pursuit,
Opens, illumes and cheers his way?
Discerns immortals from the brute,
God's image from the moulds of clay?
'Tis knowledge! and *that* to the soul
Is power, is liberty and peace;
And, while celestial ages roll,
The light of *knowledge* shall increase!"